By VIRTUE of

His Majesty's Royal Letters Patent,

GRANTED UNTO

R. DARBY, and Co.

O F

Campden in Glocestersbire,

FOR THEIR

New-invented Instrument,

FOR

DETECTING FRAUDS

IN

COUNTERFEIT GOLD.

Musar The the helich of Hull L. Bradford's fateut, 11.686 of 1753.



R B OF HIS

Majesty's Royal Letters Patent.

GEORGE R.

GEORGE the Second, by the Grace of God, of Great-Britain, France, and Ircland, King, Defender of the Faith, &c .- To all to whom these Fresents shall come, Greeting.

THEREAS, R. DARBY and Co. have, with much Labour and Study, inwented

A PORTABLE INSTRUMENT

FOR DETECTING Frauds by Counterfeit Gold,

Which gives the Weight, and spews the Alloy, as well in Coin as in all other Utensils made with that METAL, with the Quantity of Adulteration. in as little Time as Gold is queighed - And whereas they bave also invented,

A New SLIDING-RULE,

Which performs the fame at one Operation as requires two or three courte Straing Rales heretofore made. And

1753

as it has been made appear, that the faid INSTRU-MENTS will be very ufeful to our loving Subjects, we have most graciously granted unto the faid R. DARBY and Co. our Letters Patent, under the Great Scal of Great-Britain, for the fele Uje and Benefit of the Said Inventions, within England, Wales, and the Town of Berwick-upon-Tweed, and also in our Plantations Abroad. And we do, by thefe Presents, for us, our Heirs, and Successors, require, and strilly command all and every Perfen and Perfons, Bodies politic and corporate, and all other our Subjects what seever, of what State, Quality, Name, Condition or Degree Joever they be, within that Part of our Kingdom of Great-Britain called England, our Dominion of Wales, and Town of Berwick upon-Tweed, also within our Colonies and Plantations Abroad, that neither they, nor any of them, at any Time, during the Term of fourteen. Years hereby granted, either directly or indirectly, do make or put in Practice the faid Inventions, or any Part of the same, nor in any-wise counterfeit, imitate, or resemble the Same, or make any Addition or Subtraction to pretend themselves the Inventors, upon such Pains and Penalties as can or may be inflicted on Juch Offenders for their Contempt of this our Koyal Command.

In Witness whereof we have caused these our Letters to be made patent. Witness ourself at Westminster, in

the twenty Seventh Year of our Keign.





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DESCRIPTION and USE

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New-Invented Instrument,

For derecting PRAUDS in

Bad and Counterfeit GOLD,

BY SHEWING

The true Weight of every Piece of Gold Coin now current, with the Quantity of Gold and Alloy in each; and also of Adulteration, if any.

IT ALSO PROVES

The real Value of RINGS and other small Toys made of Gold; and, by applying to the Inventor, INSTRU-MENTS made on the same Principle may be had for proving Gold or Silver Utensils of any Bigness.

THE INSTRUMENT,

Which is as portable as a Penknife, and by a late Improvement made so easy that a Child may use it,

Is SOLD Wholefale and Retail,

By the PATENTEES R. DARBY, and Co. at their Warehouse at Campden, in Glocestersbire.

By Meff. HENRY & CAVE, at St. John's Gate, in London;

By S. ARIS, in the High-Street, Birmingham;

And at the PRINTING-OFFICE in Glocester:

Where Shopkeepers, for their Convenience, may be furnished on the same Terms as by the Patentees.

Ask therefore for DARBY's Patent Instrument.

^{**} The Instrument cannot be counterfeited by common Makers, without destroying its Use;

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which enabled him to examine the Composition of King Hiero's Crown, and expose the Fraud of his Goldsmith, with every modern Improvement thereon, have been in a great Measure useless to the fair Trader, for want of the Invention of some Method for readily ascertaining the Goodness of Alloy of GOLD.

readily ascertaining the Goodness of Alloy of GOLD, or the Degree of its Adulteration, by bare Inspection only, without any arithmetical Operation, or at least

Acquaintance with hydrostatic Principles.

We humbly prefume that every one, who shall please to peruse this little Treatise, will, without Scruple, allow that this important End is, to all Intents and Purposes, attainable by the little instrument we now offer to the Public; which though extreamly simple in its Construction, and most easily to be understood, is nevertheless the Fruit of much Calculation, and several Years Study and Labour.

We might enumerate many other good Purposes to which it may be applied, but more of this hereafter.

If any Persons (unacquainted with hydrostatic Principles) should doubt of the Result of this Instrument, let them take a Piece of Gold, of any Weight, and a Piece of any other Metal of the like Weight, and prove them both separately by this Instrument, according to Rules laid down, and the Difference will so evidently appear, that it will need no further Demonstration.

Before we describe this Instrument, and shew the Method of using it, we shall first observe, That those who artfully counterfeit Gold, generally make use of Silver, that being the first Metal wherewith to do it; for a Piece of Coin made with Silver, and near the Weight and Make of the Coin intended to be counterfeited, if made some-

what

what thicker in the Middle, and stampt with a good Relievo, and well gilt or plated, cannot be discovered by weighing, or any common Experiment, without defacing it: But let a Piece of Coin be ever so artfully counterfeited, it will not stand the Test of this Instrument.

It is well known Fluids resist in Proportion to the Magnitude of the Body immersed in them; and if two different Bodies are separately weighed, statically and hydrostatically, their relative Gravity is thereby known: Consequently if an unknown Quantity of Silver be cased, or gilt over with an unknown Quantity of Gold, and be weighed both statically and hydrostatically, the Weight of each Metal may separately be found to the minutest Part of a Grain, according to the Weight given.

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N. B. Had Capt. DAMPIER known this Method of determining the genuine Value of Metals, he had perhaps ventured to traffic with the Indians at the Bashee Island, for some of their yellow Rings; which, he says in his Voyages, he had no great Encouragement to do, not being able to determine whether they were Gold or not. — See CLARE's

Book of Fluids, Page 143.



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Description of the Instrument.

THE Instrument consists of a small thin Brass-Plate, about eight or nine Inches long, a little Steel Bolt, a small Chain and Tongs, and a sliding Counterpoise. On the upper Side of the Plate runs a Line or Scale of Divisions, the several Fifths marked 10, 15, 20, 25, 30, 35; each single Division representing the Value of One Shilling in GOLD; and each of these being subdivided into four Parts, each Subdivision consequently represents the Value of three-pence of the same Metal (at the Rate of 31. 18s. 1d. Half-Penny the Ounce) according to the Royal Mint Standard, by which the Guinea weighs 129 Grains.

RULES for the Use of it.

TAKE Care before you weigh, that all Parts of the Instrument, as likewise the Table or Window

on which it refts, be free from wet.

2. When you would examine a Piece of Gold Coine not exceeding 36s. you must first weigh it statically, or in the Air, in order to which the Piece must be placed between the Cheeks of the Tongs, and the Bolt thrust in as far as it will go. Then you are to bring that End of the Slider marked with a small Notch to that Divisions which represents the current Value of the Coin. Next you must place the two small Center-pins on the lower Side of the Plate, within about a Quarter, or Half and Inch of the Edge of the Table, suffering the Chain, Tongs, and Coin, to hang freely (but without swinging) over the Edge of the Table. If then there be a true Equipose

Equipoise between the Instrument and the Coin, it is full Weight; but if upon gently lifting up that End of the Instrument, which lies on the Table, and letting it go again it drops down easily, remove the Slider a Subdivision or two on towards the Bolt 'till the Instrument acts in Equilibrio, and as many Subdivisions as you have thus removed this Slider, so many Three-pences does the Piece want of its due Value, supposing it to be of the just

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Standard Alloy.

3. In order to weigh the fame Coin hydrostatically, or in Water, the Instrument resting on the Table as before, and the Notch Edge of the Slide remaining where last set, place the End of the Thumb of your left Hand on the Bolt End of the Plate, and with the Tip of the fore Finger press the Loop of the Bolt upwards, whereby the Bolt will be discharged, and spring out to its utmost Extent. Then bring a Half Pint Glass, or a Pint of clean Water in your left Hand, under the Coin, and raise it gently, 'till the whole Coin, Tongs, and the lower Half of the long Link of the Chain be immerfed beneath the Surface of the Water. If then all be in Equilibrio, as in the former Operation, or the Coin finks yet somewhat lower in the Water, it is Standard Gold; but if you are obliged to move the Slide still nearer to the Bolt, in order to procure an Equilibrium, the Piece is adulterated: And to know the Degree of the Adulteration, if it be alloyed with Silver, count Two Shillings for every Penny deficient in the hydrostatical Weight; which may be eafily estimated, though the Subdivisions run no lower on the Scale than Three-pence each: But if the Number of Pence deficient in the Hydrostatical Weight, exceeds, when doubled, the Number of Shillings it weighed flatically, it may be justly concluded, that it is adulterated with some baser Metal.

EXAMPLE. I.

SUPPOSING that on weighing a Guinea in the Air, according to the foregoing Directions, I am obliged to remove the Notch Edge of the Slider from the Division that

that represents the Value of 21s. in Gold, back to 20 ; and that upon discharging the Bolt, and weighing the same in Water, I find every Thing in Equilibrio without farther moving the Slide. I am thence to understand, that though the Guinea wants One Shilling of its just Weight, yet it is Standard Gold. But, supposing in weighing the same in Water, I have been obliged to remove the Slide back one whole Division, or to 19, to make an Equilibrium; I am to argue thus: One whole Division represents One Shilling, or Twelvepence: But Twelve-pence doubled is Twenty-four-pence; whereas the Piece weighed in Air is no more than Twenty Shillings, therefore it is alloyed with a baser Metal than Silver.

It is often found that Pieces of Coin are full Weight, yet made of very base Metal; on the contrary, some want in Weight, and yet are standard Gold, and the more like to be so, by Reason the Persons that diminish Gold Coin lay hold of the good Money, or it will not answer their Ends; but this Instrument shews the Quantity of the De-

ficiency either in Weight, or Purity, or both.

EXAMPLE II.

IF you would prove a Three Pound Twelve Shillings Portugal Coin you must put on the additional Piece, marked 31. 12s. on the bare End of the Beam, as far as it will go: Then bring the Notch Edge of the Slider to the Division marked 31. 12s. or 30 on the Plate; and proceed to all Things else, as to both the Weighings, as before directed.

Though 'tis needless in common Practice to have any Recourse to Numbers or arithmetical Calculations, yet those that are curious may turn to the Table in Page 13, whereby the Quantity of Adulteration is known to the hundredth Part of a Grain, according to the Weight

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ir, to on A more speedy Method to find the Quantity of Adulteration of Gold, without moving the Slide, after it is weighed statically, which may be sufficiently near the Iruth for common Practice.

X7 HEN you have weighed a Piece statically, and found the Weight, apply the Fluid as before, fo that the Surface of the Water may be about the Middle of the long Link whereon the Pincers are suspended; and if the Instrument doth not then equiponderate, gently lower your Hand that holds the Fluid 'till the Instrument begins to move; and by observing if any Part of the Pincers be above the Surface of the Water, you may very eafily discover whether it be adulterated, and guess at the Quantity of Adulteration :- As for Instance, if a counterfeit Half-Guinea, or other finall Piece, be tried. some Part of the Pincers will appear above Water, before the Instrument will act in Equilibrio. If a counterfeit Guinea be tried, great Part of the Pincers will appear above Water, before the Instrument will move. Again, if a counterfeit Thirty-fix Shilling Piece be tried, the Instrument will not equiponderate 'till not only the Pincers, but also some small Part of the Coin, are above the Surface. Laftly, if a counterfeit Three Pound Twelve Shilling Piece is tried, there will be more of the Metal appear above the Surface of the Water than there will in a counterfeit Thirty-fix Shilling Piece.

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In trying Gold by this last Method, observe, when the Piece and Instrument Counterpose, the Quantity of Adulteration is always in Proportion to as much of the Pincers, or of the Metal held by them, as appears

above the Surface of the Water.

It is easily conceived that the Pincers cannot appear so far above the Surface of the Water in trying a small counterfeit Piece, as one that is large, and made of the same base Metal; by Reason, the larger the counterfeit Piece is, the more it is deficient in the Hydrostatic Weight, according to the foregoing Demonstrations.

N. B. If a Piece, of any Weight, be standard Gold, the Instrument will move before any Part of the Pincers is above the Surface of the Water.

OBSERVATIONS

IF you have Occasion to weigh and prove a small Piece of Coin, as 5s. 3d. or 4s. 6d. place it in the Tongs, together with some other Piece you have proved to be Standard before, and the Weight and Alloy of such small Piece will thence be easily known.

The additional Piece is never to be put on, except the

Coin exceeds the Weight of 36s.

And if you want to weigh and prove a Piece of Coin exceeding 36s. which doth not weigh nearly 31. 12s. in that Case put the additional Piece of Brass on the Instrument, and place such Piece of Coin in the Tongs, together with some other Piece you have proved to be Standard before, and the Weight and Alloy of such uncommon Piece is readily known.



A TABLE, Seewing (by the Deficiency of the Hydrostatic Wright) the Quantity of Adulteration in a Piece of Counterfeit GOLD that is alloyed or mixed with Silver. 1 3 5 7 9 11 1 15 17 19 1 3 5 7 9 11 13 15 17 19 1 3 5 7 9 11 114,64 0
118,28 0
112,92 1
112,64 1
112,38 2
114,84 2
114,48 3
114,12 11 ,76 4
11 ,4 68 104,68 104,68 104,68 104,68 104,68 104,68 104,68 104,52 10 104,92 11 1,28 10 104,92 11 1,28 10 104,92 11 1,28 10 104,92 11 1,28 10 104,92 11 94,36 11 94,36 11 94,36 11 94,36 11 94,36 11 94,92 11 94,56 14 12 91,28 13 94,56 14 12 91,28 13 94,56 14 12 91,28 13 94,56 14 15 9 ,84 15 9 ,48 15 16 84,4 17 84,76 16 84,4 17 11,45 23,91 11,36 23,82 11,27 23,73 11,18 23,64 11,09 23,55 11, 23,46 10,91 23,37 10,82 23,28 10,73 23,19 10,64 23,01 10,55 23,01 10,46 22,92 10,37 22,83 10,28 22,74 10,19 22,65 10,01 22,47 9,92 22,38

back 15 Pence (which is one Division and one 4th Part of another); then I lock back into the fift Column of the Table for 15d, the Number of Pence it wanted hydrostatically, and in the second Column I find 11. 95. 102d. TF I weigh a Piece of Gold (suppose a Thirty-fix Shilling Piece) and find it the true Weight statically; but, when I try the Hydroftatic Weight, I find the Infirument will not equiponderate 'till the Slide is blought 6 Parts of 100th Parts of a Farthing; and so much Gold is wanting in that Piece. And, to know how much Silver is in the Room of it, look in the third Column, and there you will find 7 Pennyweights, 10 Grains, and The USE of the TABLE. 82 Parts of 100th Part of a Grain. [And so of any other Piece.]

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ATABLE

Shewing the Weight and Value of such Pieces of Gold as are current in this Kingdom, and if a Counterfeit; likewise shewing, by the Number of Pence they are desicient of the Hydrostatic Weight, of what Metal the Counterfeit is made, whether of Silver, Copper, Brass, or Tin.

Names' of the Pieces		Val. in Shillgs.	Silver	Copper.	Brass.	Tin.
1 Guin	64 1/2	10 6	5,38	7,48	9,8	9,76
a Guin	129	21 0	11,78	14,98	18,16	19,54
# Moid.	41 1	6 9	3,44	4,8	6,66	6,94
Moid.	82.1	13 6	6,90	9,62	13,34	13,88
a Moid.	165	27 0	13,8	19,26	26,70	27,78
₹36s pi	27	46	2,30	3,2	3,88	4,4
1 36s pi	55	90	4,6	6,42	7,78	8,9
18s. pie	1101	18 0	9,2	12,84	15,56	17,8
36s, pie	221	36 o	18,4	25,68	31,12	35,6
31 125 p	442	72 0	36,8	51,36	62,24	71,24

The USE of the TABLE.

Suppose you would prove a Piece called a Moidore: Look in the first Column of this Table for the Word a Moidore, and opposite to it, in the second Column, you find its true Weight to be 165 Grains, and, in the third Column, its Value to be 275. And if by weighing a Counterfeit Piece of this Kind in the Instrument, you find it is deficient in the Hydrostatic Weight 19 Pence, look further in the several opposite Columns till you find the nearest Number to 19, and under the Word Copper, in the fifth Column you will find 19,26 being the nearest Number to that sought for, whereby you may conclude the Piece counterfeited with Copper; which may serve for a Rule in other Pieces.

This Instrument is not only useful in proving the Difference of the Ponderousness of solid Bodies, but also in shewing the specific Gravity of Fluids and Liquids.

And for those who deal in Spiritous Liquors, to know what Degree of Strength they are, and when full

Proof.

Likewise to the Soap Boiler, it shewing the Strength of the Lees to a Grain, and when they are fit for the Use designed.

** Each Operation may be performed in less than

a Minute.

For, take a Piece of Common Glass that is solid, and put it in the Pincers, and rectify the Weight of it, so that it may weigh 30 Shillings when immersed so deep in common Water that the Surface of the Water toucheth the Middle of the long Link; then the same Piece of Glass will weigh in strong Lees 27 Shillings, in made Brine 28, in Proof Spirits 31 Shillings, and Four-pence. In like Manner may the specific Gravity of any Sort of Liquid be known by this Instrument.

4 Also to be had of the INVENTORS, an INSTRUMENT, that will weigh a Pound Weight of Gold, very useful for all Merchants, Gold-smiths, &c. that trade in Rings, Wedges of Gold, and Gold Dust: This Instrument will shew the true Value of Gold Dust, with the Quantity of Adulteration, if any, as well as all other Works made of that Metal. There is only this Difference to be observed in using this Instrument: Instead of Shillings and Parts, as on the small one, this is divided into Ounces and Pennyweights.

Gautions to be observed in using this Instrument.

When you weigh statically, let the Scales and Metal be dry; but when proved hydrostatically, let the Scales and Metal be well wetted, especially if it is in different Pieces; if Gold Dust, it is necessary to stir it well in Water before proved.

N. B. Merchants, Goldsmiths, &c. by applying to the Inventors, may have an Instrument made, to weigh and

prove any Quantity of Gold.

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To be had of the PATENTEES, or of Messes, HENRY and CAVE, of S. ARIS, in Birming-ham, and at the Printing-Office in Glocester.

Their New and Compleat improved

SLIDING RULE,

WHEREBY

The Contents of all Solids and Superficies are more easily and readily cast up than by the common Sliding Rule; for this Instrument will perform the same at one Operation as will require two or three on the Sliding Rules heretofore made.

As for INSTANCE.

Let a Piece of Timber or Block of Stone be never fo unequally fided, and let the Dimensions be given in any Denomination, or in different Denominations, this Instrument will give the Content at one Set or Operation, without being at the Trouble of sinding mean Proportionals, as you are forced to do in other Sliding Rules; and the making of two or three Sets gives a great Deal of Trouble, and is liable to many Missakes, as we are generally obliged to carry a mixt Number in the Head, in order to proceed to the next Operation; but

but here we are freed from that Trouble and Difficulty; and, what farther recommends it to the World, is the Commodiousness thereof, and Manner of Use; for in other Instruments you are obliged to state the Question right to find the Answer; but in this, if you should even state the Question improperly, it will come right notwithstanding, which renders it advantageous and easy to those who are unskilled in Arithmetic or common slides.

An Instance of Brickwork.—Let the Length and Height of a Wall be given, and the Number of Bricks thick, this Instrument will give the Content of any Wall in Rods, and reduce it to the Standard Thickness, at one Operation; also if the Length and Height of any Wall be given, with the Length and Thickness of one Brick, the Instrument will shew, at the Operation, the Number of Bricks it will take to build such Wall.

It is also of great Use in framing of Timber for Building, shewing the Lengths of all Hyps, Valleys, Gutterpieces, or King-pieces, &c. at any Pitch assigned, not only in square Buildings, but also in bevel Roofs; which Lengths cannot be found by any Arithmetical Proportions, or by any other Sliding Rule, yet are shown on this by Inspection: And, therefore, not only of great Use to the Master Builders, but also to the common Carpenter, who

is unskilled in the Rules of Architecture.

There are also many Advantages in measuring Superficies as well as Solids by this Instrument: As for Instruction in the Content of a whole Stock of Boards be required, by setting the Instrument for the Length and Breadth of one Board only, you have the Content of any Number of those Boards whatsoever: The Slide being set for one Board, the Instrument is in Effect a Table of the Contents of any Number of Boards, without moving any Part of the Instrument: If there are Parts of a Foot in one Board, all the Parts as well as the Feet are summed together in the Content of the whole Stock at the same Operation.

In like Manner may the Glazier fum up the Content of any Number of Panes of Glass at one Set;—or a Blacksmith the Contents of several Casements.

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For Paving:--Let the Length and Breadth of a Floor, and the Length and Breadth of one Brick, &c. be given, it shews, at one Operation, how many Bricks, &c. will pave such Floor.

This Instrument not only surpasses the common Slides in these Particulars, but also in many more of great Confequence. I shall only instance in these following.

There are but few useful Questions in Business relating to the measuring of Solids (except Cylinders) that can be answered at one Set of the Sliding Rules now in Use: for we feldom meet with a Piece of Timber or Stone to be measured which hath equal Sides, therefore cannot be answered at one Set on the common Sliding Rules, unless there he a Line fitted by the Instrument Maker for one particular Purpose; then the said Rule is rendered useless in all other Cases, and will not cast up any Solid that is in any other Form; or if the Dimentions are given, or the Content required in any other Denomination than what the Rule was made for, it will not answer the Question; but this Instrument remedies all those Inconveniences in Sliding Rules now in Use; for if the Dimensions be given or required in what Denomination soever, or different Denominations, it answers the Question with the same Speed and Exactness as if given or required in any particular Denomination.

There are a great many more Solids that the Sliding Rules will not cast up at one Operation, which this Instrument will with Ease and Speed; as triangular Prisms, Pyramids, elliptical Cones, Globes, &c. also those whose Bases are elliptical, or Parallelograms, Rhombusses, Rhomboides, Trapeziums, Poligons, and many others.

In fine, This Inftrument multiplies any three Numbers together successively, and divides that Product by any other Number, at one Set of the Slide, which comprehends all the most useful Questions relating to the measuring of Superficies and Solids. It also performs the

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compound or Double Rule of Three, containing five Numbers given to find a fixth; which no other Sliding Rule will perform at one Operation.

N.B. The Use of this Instrument is so much easier learn'd and understood than the Sliding Rules now in Use, that any Person unskilled in Arithmetic or Sliding Rules, may, (with the Directions given) be capable of giving the Content of any Timber Stone, Brickwork, Gauging, paving, Tiling, plaistering, painting, Sc. in a more easy Method than hath been heretofore in Use.

The Authors hereof have a neat Sort of Rules for the curious, with Brass Slides: And likewise can make them of Ivory with Silver Furniture for those that require it, by sending to them, or to Messrs. Henry and Cave, at St. John's-Gate, or S. Aris, Printer, in Birmingham, (Post-paid.)





